SCH 4U0
Organic Chemistry

Answer Key

Name:_____
Date: _____

Knowledge and Understanding	Application and Communication	Inquiry
/26	/21	/12

Knowledge and Understanding **/26**

PART 1: Multiple Choice [14 Marks]

1. Carbon is able to form large numbers of organic compounds because carbon can
   a. form 4 bonds
   b. form single, double and triple bonds
   c. form chains, rings, spheres and sheets
   d. the carbon-carbon bond is very stable
   e. all of the above

2. From the following list, select the two molecules that are isomers:
   1. $CH_3CH_2CH_2CH_2CH_3$ 2. $CH_3CH_2CH_2CH(CH_3)_2$
   3. $CH_3CH(CH_2CH_3)CH_2CH_3$ 4. $CH_3CH_2CH_2\text{-}C(CH_3)_2$

   a. (1) and (2) only
   b. (1) and (3) only
   c. (1) and (4) only
   d. (2) and (3) only
   e. (2) and (4) only

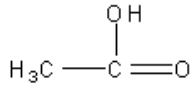
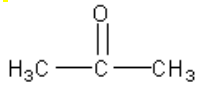
   -only option with same number of carbons and hydrogens

3. Which one of the following compounds is not expected to be completely soluble in water at room temperature?
   a. $CH_3CH_2CH_2OH$
   b. CH_3CO_2H
   c. $CH_3(CH_2)_{16}CO_2H$
   d. CH_3OH

   -carboxylic acids with ≤ 5 carbons are soluble in water
   -weakest intermolecular forces Boiling points: alkanes < ethers < amine < aldehyde < ketone < alcohol <acid

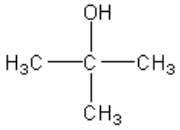
4. Which compound is most likely to be a gas at room temperature?
   a. propane
   b. 2-chloropropane
   c. Propanal
   d. Propanone

5. An amine is characterized by what functional group?
   a. $-CO_2CH_3$
   b. $-NH_2$
   c. $-CO_2H$
   d. -CHO
   e. -OH

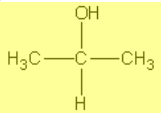
6. Which of the following is an alcohol?
   a. NaOH
   b. 
   c.
   d. CH_3CH_2OH
   e. 

7. When two alcohols undergo a self condensation, what is formed?
   a. liquid alcohol
   b. a ketone
   c. an ester
   d. an aldehyde
   e. an ether

8. Which of the following is a secondary alcohol?

a. 

b. CH_3OH

c. 

d.

e. CH_3CH_2OH

9. What results when a secondary alcohol is oxidized?

a. a ketone
b. an amine
c. an aldehyde
d. an acid
e. no reaction

10. Which type of reaction will an alkene **not** undergo?

a. addition
b. polymerization
c. oxidation
d. dehydration
e. hydration

12. Which of the following classes of organic compounds does **not** contain oxygen?

a. aldehydes
b. Amines
c. amino acids
d. ethers
e. amides

13. Butane and fluorine gas would react by which of the following?

a. addition
b. combustion
c. substitution
d. single displacement

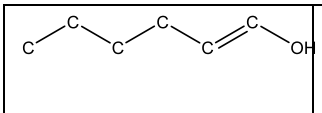
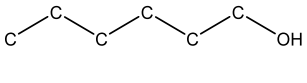
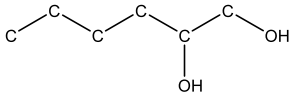
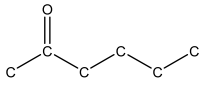
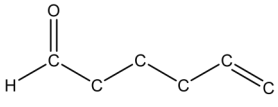
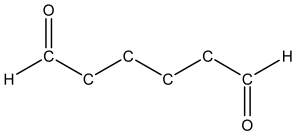
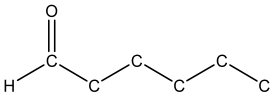
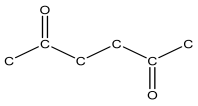
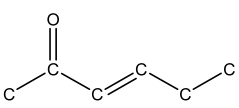
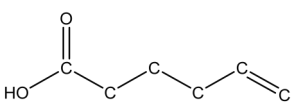
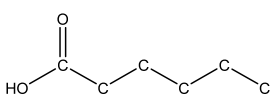
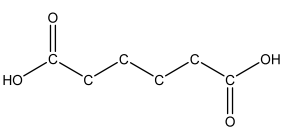
14. Which of the following compounds is a secondary alcohol?

a. 1-pentanol
b. 2-pentanol
c. 2-pentanone
d. 2-methyl-2-butanol

PART 2: MATCHING

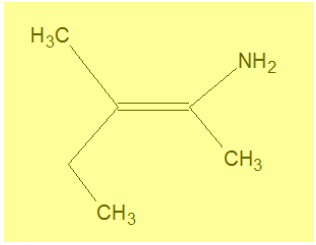
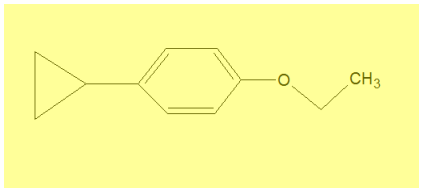
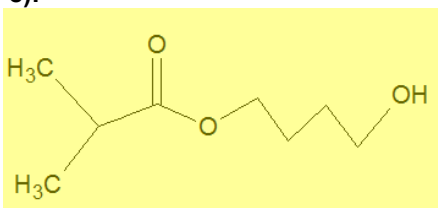
15. Match each structure provided to the ***correct*** name from the list below (**A → L**): [12 marks]

A. hexanal	D. hexanoic acid	G. 2-hexanone	J. hexandioic acid
B. 1,2-hexandiol	E. 5-hexenal	H. 1-hexanol	K. hexandial
C. 1-hexen-1-ol	F. 2,5-hexandione	I. 5-hexenoic acid	L. 3-hexen-2-one

 ***structure:*** ***C***	 ***structure:*** ***H***	 ***structure:*** ***B***	 ***structure:*** ***G***
 ***structure:*** ***E***	 ***structure:*** ***K***	 ***structure:*** ***A***	 ***structure:*** ***F***
 ***structure:*** ***L***	 ***structure:*** ***I***	 ***structure:*** ***D***	 ***structure:*** ***J***

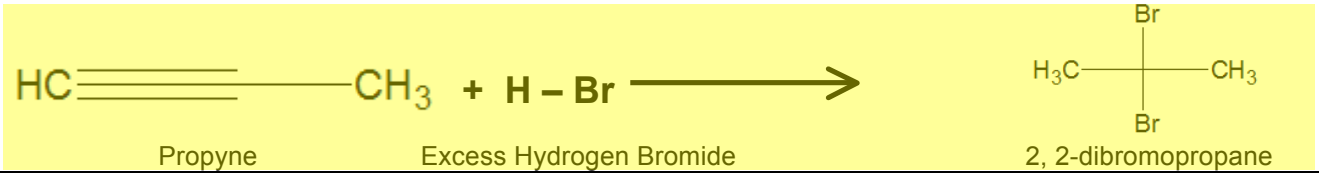
Application and Communication	**/21 Marks**

16. Draw the structures (line-diagram or carbon skeleton) from the names provided: [9 marks]

a).	**b).**	**c).**
		
structure a):	Trans-2-amino-3-methyl-2-pentene	
structure b):	1,4-ethoxycyclopropylbenzene	
structure c):	4-hydroxylbutyl-2-methylpropanoate	

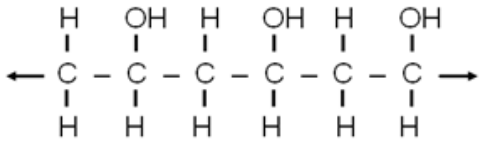
17. Complete the following reactions, by **drawing all reactants**, then **drawing and naming all products**. [8 marks]

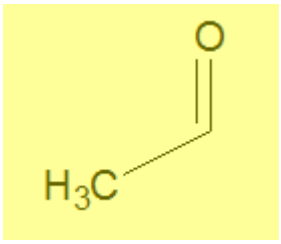
propyne + excess hydrogen bromide →

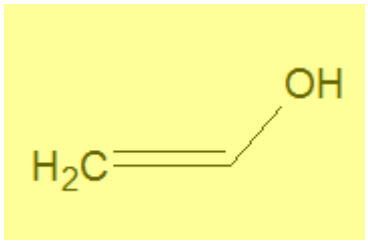


Benzene + chlorine gas →

18. The polymer PVA is used in hair sprays and styling gels. Draw and name a structural diagram of its monomer(s). (Hint: the monomers exists as tautomers- please draw both). [3 marks]







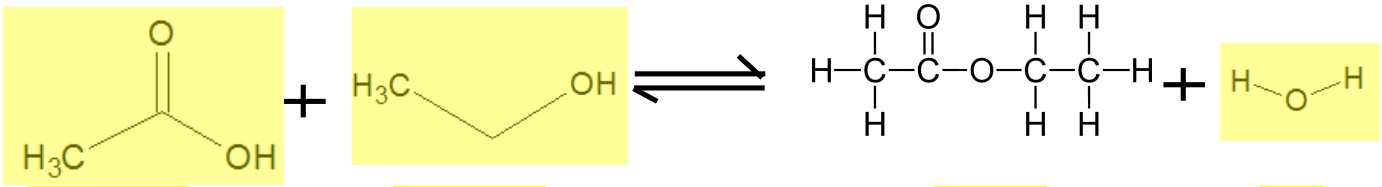
Polymer Structure of Monomer 1 Structure of Monomer 2

Names of Monomers: ethanol or acetaldehyde ethylene oxide

Inquiry	**/12 marks**

19. Write the reaction showing how the ester below can be prepared from a carboxylic acid and an alcohol. Provide the names of all reactants and any other products, below your equation.

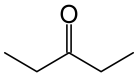
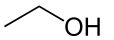
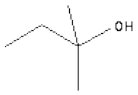
[6 marks]



Ethanoic acid ethanol ethyl ethanoate water

20. At least one of the following reactions is not possible. Identify the impossible reaction(s) and explain your reasoning:

[6 marks]

	Reaction	Circle One:	Your Reasoning:
1	 + oxidation → product	possible / not possible	Ketone – no hydrogen left on carbonyl carbon. Therefore can't be oxidized.
2	 + oxidation → product	possible / not possible	2 hydrogens available to be replaced by oxidation on hydroxyl carbon
3	 + oxidation → product	possible / not possible	Tertiary alcohol – no room for oxidation of hydroxyl carbon